

Appln No. 10/647,070
Amdt date December 4, 2006
Reply to Office action of October 4, 2006

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for detecting a network isolation in a network comprising a plurality of network nodes and a group of one or more root nodes, the method comprising:

configuring the group of root nodes to periodically generate beacon packets;
~~configuring the plurality of network nodes never to generate beacon packets;~~
configuring the plurality of network nodes to have finite states consisting of:

an idle state;

a discovery state;

a reconfiguration state;

a search state;

a wait state; and

a registration state;

receiving at the plurality of network nodes a beacon packet originating from the group of root nodes and received through an adjacent one of the root or network nodes;

storing at each of the plurality of network nodes an aging indicator for the received beacon packet after an aging interval; and

if the aging indicator is not reset by a second beacon packet received through the adjacent one of the root or network nodes before a second interval greater than the aging interval, then:

indicating a network isolation condition; and

listening for a new beacon packet originating from the group of root nodes and received through a different one of the root or network nodes.

2. (Previously Presented) The method of claim 1, wherein each of the beacon packets comprises a universal destination address for validating the beacon packet.

3. (Previously Presented) The method of claim 1, said receiving further comprising:
receiving the new beacon packet from another adjacent one of the root or network nodes other than the adjacent one of the root or network nodes; and
dropping the new beacon packet received from said another adjacent one of the root or network nodes when the network isolation condition is not indicated.

4. (Previously Presented) The method of claim 3, further comprising:
transmitting a request to said another adjacent one of the root or network nodes to register said another adjacent one of the root or network nodes as a ~~new~~ parent node when the network isolation condition is indicated.

5. (Previously Presented) The method of claim 4, said transmitting further comprising:
transmitting a discovery message upstream; and
receiving a reply to the discovery message from said another adjacent one of the root or network nodes on an upstream port.

6. (Previously Presented) The method of claim 4, further comprising:
receiving an approval from said another adjacent one of the root or network nodes in response to the request;
deleting a parent status of the adjacent one of the root or network nodes; and
storing an indication of said another adjacent one of the root or network nodes as the parent node.

7. (Original) The method of claim 1, wherein the second interval is at least twice the aging interval.

8. (Previously Presented) The method of claim 1, further comprising:
continuously receiving a plurality of beacon packets that are individually transmitted by at least one of the root nodes at an interval that is shorter than the aging interval.
9. (Previously Presented) The method of claim 1, further comprising:
transmitting the beacon packet received from the adjacent one of the root or network nodes to all neighboring network nodes.
10. (Original) The method of claim 1, further comprising:
receiving a network reconfiguration command; and
selecting a new parent node that is not a descendant node within the network in response to the network reconfiguration command.
11. (Previously Presented) The method of claim 10, further comprising:
operating in a discovery state after receiving the network reconfiguration command until an ancestor/descendant relationship is identified.
12. (Original) The method of claim 1, said storing performed by a network switching element of a node without any processing by a central processing unit (CPU) of the node.
13. (Previously Presented) The method of claim 1, wherein the network comprises an Ethernet protocol network.
14. (Previously Presented) The method of claim 1, wherein the age indicator is stored in an age field of a packet address table.
15. (Previously Presented) The method of claim 1, further comprising:
storing an age indicator for a plurality of stored data packets other than the beacon packet at the aging interval.

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16. (Currently Amended) A computer readable medium encoded with processing instructions for implementing a method for detecting a network isolation in a network comprising a plurality of network nodes and a group of one or more root nodes, the method comprising:

configuring the group of root nodes to periodically generate beacon packets;

~~configuring the plurality of network nodes never to generate beacon packets;~~

configuring the plurality of network nodes to have finite states consisting of:

an idle state;

a discovery state;

a reconfiguration state;

a search state;

a wait state; and

a registration state;

receiving at the plurality of network nodes a beacon packet originating from the group of root nodes and received through an adjacent one of the root or network nodes;

storing at each of the plurality of network nodes an aging indicator for the beacon packet after an aging interval; and

if the aging indicator is not reset by a second beacon packet received through the adjacent one of the root or network nodes before a second interval greater than the aging interval, then:

indicating a network isolation condition; and

listening for a beacon packet originating from the group of root nodes and received through a different one of the root or network nodes.

17 (Currently Amended) An apparatus for detecting a network isolation in a network comprising a plurality of network nodes and a group of one or more root nodes, the apparatus comprising:

means for configuring the group of root nodes to periodically generate beacon packets;

~~means for configuring the plurality of network nodes never to generate beacon packets;~~

means for configuring the plurality of network nodes to have finite states consisting of:

an idle state;

a discovery state;

a reconfiguration state;

a search state;

a wait state; and

a registration state;

means for receiving at the plurality of network nodes a beacon packet originating from the group of root nodes and received through an adjacent one of the root or network nodes;

means for storing at each of the plurality of network nodes an aging indicator for the received beacon packet after an aging interval; and

means for, if the aging indicator is not reset by a second beacon packet received through the adjacent one of the root or network nodes before a second interval greater than the aging interval, then:

indicating a network isolation condition; and

listening for a beacon packet originating from the group of root nodes and received through a different one of the root or network nodes.

18. (Currently Amended) A method for identifying a network connection failure at a network node, the method comprising:

receiving a beacon packet from an adjacent node over a network comprising a plurality of nodes including the network node and the adjacent node, and at least one root node configured differently from the plurality of nodes, wherein only the at least one root node is

configured to generate beacon packets and the plurality of nodes are configured to ~~never generate beacon packets~~ have finite states consisting of: an idle state; a discovery state; a reconfiguration state; a search state; a wait state; and a registration state, the beacon packet comprising a latest of a series of received beacon packets transmitted at a beacon interval by the at least one root node;

storing an age indicator for the received beacon packet after an aging interval that is greater than the beacon interval;

storing the age indicator until a receipt of a subsequent beacon packet; and

determining the network connection failure based on the age indicator if the subsequent beacon packet has not been received from the adjacent node prior to an outage interval that is greater than the aging interval.

19. (Previously Presented) The method of claim 18, wherein the outage interval is at least twice the aging interval.

20. (Currently Amended) A method for establishing a self-healing tree network including at least one root node and a plurality of network nodes, the method comprising:

generating a beacon packet including a unique source address by the at least one root node;

transmitting the beacon packet downstream at an interval that is less than an aging interval used to age the beacon packet, wherein the network nodes are configured to use the age of the beacon packet to determine a network isolation, and

wherein the at least one root node is configured to [[always]] operate as a root node and the network nodes are configured to ~~always operate as nodes that are not root nodes~~ have finite states consisting of: an idle state; a discovery state; a reconfiguration state; a search state; a wait state; and a registration state.

21. (Currently Amended) A method for re-establishing a network connection for a network node, the method comprising:

determining a network isolation based on an age indicator of a beacon packet received from a parent node over a network comprising a plurality of nodes including the network node and the parent node, and at least one root node configured differently from the plurality of nodes, wherein the at least one root node is configured to generate and transmit beacon packets and the plurality of nodes are configured to ~~never generate beacon packets~~ have finite states consisting of: an idle state; a discovery state; a reconfiguration state; a search state; a wait state; and a registration state;

searching for a new beacon packet from a neighboring node of the plurality of nodes other than the parent node;

receiving the new beacon packet from the neighboring node; and

transmitting a registration request to the neighboring node to establish the neighboring node as a new parent node.

22. (Previously Presented) The method of claim 21, further comprising:
receiving an acknowledgement of the registration request from the neighboring node; and
establishing the neighboring node as the new parent node.

23. (Currently Amended) A method for accepting a child node, the method comprising:

receiving a beacon packet from a neighboring node in a network comprising a plurality of network nodes including the child node and the neighboring node, and at least one root node configured differently from the network nodes, wherein only the at least one root node is configured to generate and transmit beacon packets, and the network nodes are configured to ~~never generate beacon packets~~ have finite states consisting of: an idle state; a discovery state; a reconfiguration state; a search state; a wait state; and a registration state;

transmitting a registration request to the neighboring node to establish the neighboring node as the child node;

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transmitting a discovery message on an upstream port to determine if the neighboring node is an ancestor node; and

receiving an acknowledgement of the registration request if the discovery message is not later received from the neighboring node.

24. (Previously Presented) The method of claim 23, further comprising:

determining whether the neighboring node is an ancestor node based on a stored address of the neighboring node; and

transmitting the discovery message only when the stored address is not an ancestor address.